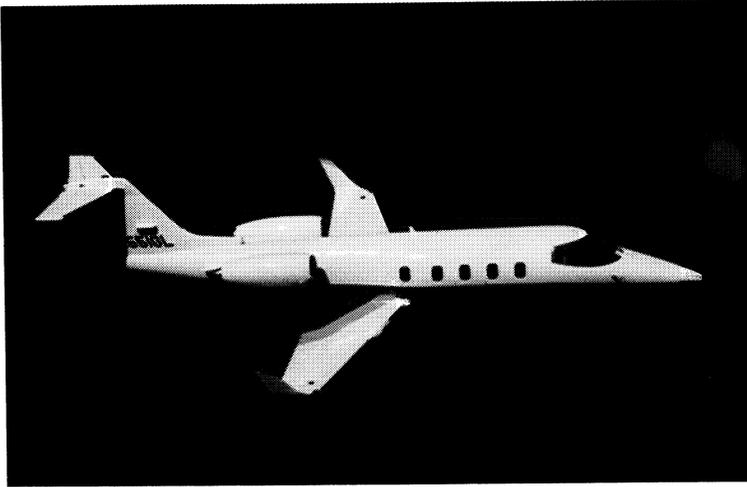


## Longhorn Business Jets

The airplane shown is the new Learjet Longhorn 55, a twin-turbofan, 13-place widebody business jet which—along with visually identical companion models Longhorn 54 and 56—will make its service debut this year. Manufactured by Gates Learjet Corporation, Wichita, Kansas, the Longhorn 54/55/56 models feature “winglets,” nearly-vertical extensions of the wing (shown in closeup below). Developed in NASA’s Aircraft Energy Efficiency



program, the winglet is an aerodynamic innovation designed to reduce fuel consumption and generally improve airplane performance. Gates Learjet was the first manufacturer to use the winglet design in production-type jets, initially on the Longhorn 28/29 models introduced to service in 1979. Several other plane builders are taking advantage of the NASA technology.

Winglets are lifting surfaces designed to operate in the “vortex,” or air whirlpool, which occurs at an airplane’s wingtip. This complex flow of air around the wingtip creates drag which retards the plane’s progress. The winglet reduces the strength of the vortex and thereby substantially reduces drag. Additionally, the winglet generates its own lift, producing forward thrust in the manner of a boat’s sail. The combination of reduced drag and additional thrust adds up to significant improvement in fuel efficiency.

Winglets are particularly effective on the Learjet Longhorns, which are capable of flying at altitudes up to 51,000 feet, unusual for civil aircraft. At such altitudes, where the air is thinner, the drag reduction afforded by the winglets is more pronounced, thus fuel savings are greater. Winglets, together with an advanced design basic wing, give the Longhorns longer range than predecessor Learjets for the same speed and payload; alternatively, for the same range and payload, they can fly at lower takeoff weight because less fuel is required.

